MAMMUT
Structures & Panel

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Mammut: A Leader in Production and Innovation

Mammut has become one of the pioneers of the industry since 1991 by focusing on quality, innovation and reliability. With about 50 years of experience and 2,000,000 square meters of production space, this company is a leader in the production of sandwich panels, steel structures, industrial metal sheds, residential and industrial cabin, prefabricated buildings, industrial cold rooms, specialized trailers, heavy trucks, commercial and passenger cars. Mammut's commitment to quality and innovation has made this brand the first choice of customers.

Mammut Structures & Panel Company: A New Step in Development

In 2024, with the aim of focusing on key and related fields, Mammut Holding concentrated on the production of sandwich panels, steel structures, industrial metal sheds, prefabricated buildings, industrial and residential sheds in the specialized company of Mammut Structures & Panel.

All products are manufactured in Mammut Industrial park, by using advanced technology and exclusive systems of Mammut.

Mammut Vision: A Sustainable Future

As one of the largest industrial companies in the country, Mammut is committed to providing world-class products. **Our slogan: "Experience the Best."**

With industrial leadership, advanced technologies and expert employees, Mammut will continue to shape the Middle East market and leave a lasting impression.

Iran Mall

Metal Skeleton and Steel Structures

The use of steel as a construction material began in the early 20th century. After World War II, the accessibility and easier procurement of steel, along with its decreased prices, significantly increased the use of steel skeletons, making them of great interest to many engineers and building designers.

The fabrication of the steel structures of Mammut Company began operations in 2003. Today, with annual production records of 50,000 tons and executing over 2,500 diverse projects inside and outside the country, including industrial warehouses, power plant structures, oil and gas structures, petrochemical, pipe racks, vehicle and railway bridges, hotel steel frames, hospitals, residential and administrative buildings, we strive to fulfill our responsibilities regarding design, engineering, quality, and capacity of fabrication in the best possible manner.

We are proud to lead in the preparation, formulation, and implementation of Iran's national standards 3834-6, 3834-5, 3834-2, and 3834-1 in the steel structures industry and have obtained the permission from the Supreme Council of Standards of Iran to use the Iran standard mark on the manufactured products of Mammut.

We are leading in compliance with comprehensive quality requirements, including welding, in the fabrication of steel frames. You are certainly aware that one of the requirements for mandatory standards is having related equipment for various non-destructive tests such as PT, MT, and UT, all of which are carried out during the production process by experienced and qualified personnel.

One of the most significant advantages of the production lines of this company is having the latest version of shot blasting machines and a painting room equipped with a heating system. With a team of specialized human resources, we have utilized advanced equipment including CNC cutting systems, CNC drills, Submerged arc welding machine, H Beam (Plate Girder) Manufacturing Machine , H Beam Straightening Machine, box making machines, Wagner equipment, and more to achieve the highest productivity in building excellent products.

We are fully prepared to negotiate EPC contract agreements considering the existing potentials within the Mammut holding group, including Mammut Construction Company, Mammut Technology, and Mammut Vazneh, to alleviate customers' concerns in designing and completely delivering a project.

Kisan Pak Co.

Ilam Petrochemical Co.

South Pars

Industrial Sheds

Industrial Sheds are among the most important structures in the world of industry and commerce. There are various types of Sheds, which the beam Shed is one of the most common. Beam Sheds are metal structures where the main material used for their production is steel sheets, which are selected based on the dimensions of the final project and are connected through welding or bolts. The metal sheds found in our country can be considered classic and heavy sheds, which have the most applications among the various types of sheds. The flexibility of these types of sheds in design and fabrication has made beam sheds one of the most recognized and oldest products in the industry.

The Industrial Revolution in Europe led to many changes in industries. One of its effects was the increased use of iron in the construction industry. Following this event and the widespread use of iron, the need and demand for it increased. Therefore, experts were looking for new solutions to enhance the structure's resistance and reduce its weight by examining girders. This is how beam sheds entered the industrial world.

Components of Sheds

The main components used in constructing the skeleton of all types of sheds are the same, and each type of sheds can include other parts depending on its specific application. To have a suitable shed, it is essential that all these main and secondary components are constructed with precision and the best possible quality.

Main Components

Column: The columns bear the main load and weight of the shed; therefore, they are the most critical and important parts of the shed. The implementation of the columns occurs after the foundation is laid, and the shed columns are secured to the base plate using bolts.

Strut: Struts serve as lateral supports responsible for connecting the consecutive main frames along the longitudinal axis. The installation of struts is done through flange connections to the main middle beam on one side and on the other side to the main column.

Rafter: These components are used in the roof of the sheds and have a truss-like appearance. Each rafter is constructed from two steel beams separately and is transported in that form to the project site for assembly with cranes. The number of rafters required for each sheds depends on the project's dimensions.

Brace: The shed structure is sensitive and vulnerable. Therefore, additional components are necessary for greater support and to enhance strength. For this reason, braces are used to protect the steel frame of beam sheds. Different types of braces such as tension rods, wall posts, and other types of braces are used in beam sheds. Lack of braces in the sheds structure reduces the safety of the structure.

Purlin: These components are considered secondary connections of the shed, made of Z profiles. The duty of the purlin is to provide the strength of the shed roof and to bear the weight of the covering placed on it. These components are implemented between the primary roof frames at specified intervals along the length of the shed.

Secondary Components of Sheds

Base Plate: The base plate is used at the point where the columns connect to the foundation of the shed.

Wall Post: These components are actually the secondary columns used at the beginning and end of the shed.

Gutter: Gutters are responsible for directing water from the roof downward to prevent damage from moisture.

Wind Brace: The purpose of using Wind Brace is to increase the stability of the structure.

Flange Stay: The role of the Flange Stay is to prevent torsion in the beam.

Beam Sheds

Turbo Comporessor
Qazvin

Advantages of Beam Sheds
Simple Transfer
The components and parts of the beam shed are made separately and are implemented using bolts and nuts at the final location of the project. This makes moving the structure less of a challenge if necessary.
High Strength and Longevity
The main material for the production of beam sheds is steel and the structure has good strength. For this reason, it can be used for long periods and even decades.
The Possibility of Using a Crane
Beam sheds have a very suitable height, which allows you to use overhead cranes in the shed environment.
The Possibility of Building a Multistorey Shed
Some industries prefer to add more floors to their sheds due to the special uses they have in mind, which is possible in beam sheds.
Recyclability
The parts used in beam shed can be recycled or reused.
Suitable for Sheds with Small Hanger
Maybe choosing beam sheds is not suitable for sheds that have a large hanger, but they are very suitable for sheds that have a smaller hanger.

Applications of Beam sheds

Warehouses and Storage Spaces: Due to their high strength and durability, beam sheds are used as warehouses and storage spaces.

Workshops and Factories: These sheds, due to their flexibility in design and fabrication, can be customized according to individual needs and various applications, making them very popular for establishing workshops and industrial factories.

Sports and Exhibition Halls: Beam sheds are used as sports and exhibition halls due to their quick fabrication and installation. The speed of erecting these sheds makes them an excellent option for sudden events.

Agricultural Sheds: These sheds are used to create agricultural spaces such as storage for agricultural products and animal husbandry due to their resistance to various weather conditions.

Strength of Beam sheds

Due to the presence of steel in the structure of beam sheds, these structures are very strong. This, along with the use of braces at appropriate points and an optimized design, can significantly enhance the shed's strength. However, it should be noted that if the necessary standards are not observed and there is insufficient precision in the fabrication process, the required strength may not be achieved, leading to serious damage under specific weather conditions such as wind, heavy rain, earthquake, or fire. Some people consider the use of steel as the reason for the heavy weight of beam sheds, while if the necessary standards are followed during the fabrication process, the final weight of these projects will be at an acceptable level.

Truss sheds

A truss shed is a type of metal structure made by combining beams and truss parts. These structures are connected using triangular-shaped components to form a strong network. The truss design allows loads to be distributed uniformly, improving the structure's strength and stability. The steel truss acts as the main load-bearing member of these types of sheds.

History of Truss sheds

The use of trusses dates back to ancient times when humans used wood and stone to build bridges and large structures. The triangular design of trusses, known for their stability and strength, has been in use since then. In the industrial era and the development of steel as a primary fabrication material, the use of trusses in warehouse construction increased.

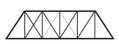
The first modern truss sheds were built in Europe and America in the late 19th and early 20th centuries. In Iran, the use of truss sheds began decades ago and gradually became one of the most popular structures in various industries. The development of the steel industry and the increasing demand for modern industrial structures boosted the use of truss sheds.

Types of Truss sheds

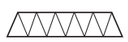
- **Simple Truss sheds:** These warehouses result from connecting trusses each composed of three members in two groups.
- **Composite Truss sheds:** These structures use more than one type of truss in their construction, with the important advantage of having no limitations in constructing wide spans.
- **Complex Truss sheds:** The application of this type of truss shed is less common than the previous two types and is used in specialized structures.

Types of Trusses

Triangular Truss (Simple): A structure consisting of triangles that evenly distributes forces. This type of truss is suitable for small projects and lightweight roofs.

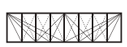


Pratt Truss: Features vertical members under compression and diagonal members under tension. This design is ideal for bridges and industrial buildings with variable loads.



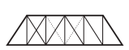
Warren Truss: Consists of repeating triangular members that distribute loads uniformly. It is used for large structures and long bridges.

K Truss: Designed in the shape of a K, it has high strength and is suitable for tall buildings and industrial structures with heavy loads.



Fink Truss: Economical and low-consumption, suitable for medium spans.

It is commonly used in residential roofs and small warehouses.



Howe Truss: Features diagonal members under compression and vertical members under tension, optimizing the distribution of loads. It is used in pedestrian bridges and industrial buildings.

Truss Sheds

Components of Truss sheds

Beams and Columns: Beams and columns are the main members of the truss structure that bear vertical and horizontal loads. These members are typically made from steel or aluminum, which offer high strength and low weight.

Truss: Truss members consist of triangular-shaped pieces that are interconnected in a network. These members help distribute loads and increase the strength of the structure.

Foundations: Foundations are the lower parts of the structure responsible for transferring loads to the ground. They are usually made of reinforced concrete to provide the necessary strength to withstand applied loads.

Roof and Wall Covering: The roof and wall coverings play an essential role in protecting the structure from weather elements and creating a suitable indoor environment. These coverings are typically made from steel sheets, polycarbonate, or sandwich panels.

Advantages of Truss Sheds
High Strength and Stability
One of the most important advantages of truss sheds is their high strength and stability. Truss design causes uniform distribution of loads, which helps to increase the resistance of the structure against various forces.
Reduction of Material Usage
The special design of the trusses reduces the weight of the structure and thus reduces the consumption of materials. This helps to reduce fabrication costs as well as fabrication time.
Flexibility in Design
Truss sheds have high flexibility in design due to their modular structure. This feature allows engineers and architects to design structures in different sizes and shapes to suit specific project needs.
Speed of Fabrication and Installation
Due to the prefabricated parts and the use of modern installation methods, the speed of fabrication and installation of truss sheds is very high. This helps to reduce the project time and costs associated with it.
Cost
Truss sheds are generally less expensive than other types of sheds due to reduced material consumption and fabrication time. This is especially useful for large and industrial projects that require a limited budget.

Applications of Truss sheds

Warehouses and Storage Centers: Truss warehouses are very suitable for creating warehouses and storage centers due to their spacious interiors and high strength. These structures can effectively store and manage various goods and materials.

Workshops and Factories: Truss warehouses, with their high strength and large internal space, are suitable for establishing workshops and industrial factories. These structures can effectively accommodate and utilize heavy equipment and machinery.

Sports and Cultural Halls: The unique design and open interior space of truss warehouses make them suitable for creating sports and cultural halls. These structures can be used as multipurpose venues for hosting various events.

Exhibitions and Exhibition Spaces: Due to their design flexibility and spacious interior, truss warehouses are highly suitable for creating exhibition and conference spaces. These structures can be quickly produced, installed, and utilized for holding exhibitions and conferences.


Ayandeh Bank

Metal Building Skeletons

A metal building skeleton is a very practical subset of metal structures. In simpler terms, metal building skeletons are the steel frameworks you see at the beginning of a building's construction. These structures are used to construct buildings of various sizes and different applications. The primary role of a metal skeleton in a construction project is to create sturdy foundations and columns on which subsequent construction stages occur. In other words, this structure provides the skeleton of a building and determines its strength.

History of Metal Building Skeletons

Metal skeletons, considered as one of the most important developments in the construction industry, have had a significant impact on the design and execution of structures. In the late 19th century, with the advancement of technology and mass production of steel, the use of metal skeletons in buildings began. One of the early prominent examples was Insurance Building in Chicago, built in 1885. With the onset of the 20th century, technological advancements and the development of welding and connection methods the use of metal skeletons had expanded. During this period, tall buildings and skyscrapers widely utilized metal skeletons.

Importance of Metal Frame Structures

The building skeleton, as the main framework, bears all live and dead loads and transfers them to the ground. Proper design and precise execution of the skeleton are of great importance and can significantly impact the structure's resistance to various factors such as earthquakes, wind, and external loads.

Types of Metal Building Skeletons

Bolted Metal Skeletons: The types of metal building skeletons differ based on how their components are connected. In bolted metal structures, the connections between steel columns and beams are made using bolts and completed in the factory. The bolted type is often considered the best metal building skeleton because its fabrication processes are completed entirely in the factory following necessary standards.

Advantages: Most fabrication steps of this structure are completed in the factory, increasing the speed of project construction. This high speed minimizes congestion and crowding at the construction site. The easier transportability of these structures compared to welded ones has made them popular in larger projects. Unlike welded metal frames, bolted frames show more flexibility under weather conditions.

- **Welded Metal Skeletons:** The fabrication of welded metal building skeletons occurs at the final construction site. The beams and columns of the steel structure are cut and welded together at the construction site. If the welding processes are not performed correctly, the building skeleton may weaken due to natural factors, leading to potential structural failures.

Advantages: It is recommended to use welded connections for structures subjected to torsional forces. The absence of additional bolts in this type of metal building frame results in a more uniform and aesthetically pleasing appearance.

Metal Building Skeletons

Applications of Various Types of Metal Building Skeletons

Bolted Metal Skeletons: This category of metal building structures is used in the construction of large skyscrapers that require high speed and precision in building. The ability for quick relocation and installation makes these structures suitable for large-scale projects.

- **Welded Metal Skeletons:** This type of building structure is used for constructing lower-scale buildings. Generally, it is recommended to use welded metal skeletons for buildings with simple designs.

More Specifically, the Applications of Metal Building Structures include:

- **Residential Buildings:** Metal building structures are used in residential construction due to their design flexibility and high strength, especially in earthquake-prone areas.
- **Commercial and Office Buildings:** The use of metal structures in commercial and office buildings is very common due to the high speed of execution and the ability to create large spaces without intermediate columns.
- **Bridges and Transportation Structures:** Metal building structures are widely used in the construction of bridges and other transportation structures due to their high resistance to compressive and tensile forces.
- **Sports and Exhibition Halls:** The use of metal building structures in constructing sports and exhibition halls is very common due to the possibility of creating spacious and unrestricted areas.

Steps for Executing Metal Building Skeletons

1. Design and Structural Calculations: In this phase, engineers use specialized software to conduct design and structural calculations. These calculations include determining the dimensions and types of materials used in the skeleton, reviewing applied loads, and analyzing the stability of the metal building structure.

2. Foundation or Base: At this stage, the foundation or base of the building is constructed precisely according to the execution plans. The foundation is responsible for transferring the skeleton loads to the ground and must be executed carefully and according to standards.

3. Installation of Columns and Beams: After the foundation is completed, the main columns and beams of the skeleton are installed. This stage includes accurate cutting and connecting of components to each other and stabilizing them on the foundation.

4. Implementation of Walls and Roofs: In this phase, the walls and roofs of the building are installed. These components not only separate internal spaces but also play a significant role in the stability of the structure and need to be executed with precision.

5. Coating and Protection: After the installation of the metal building skeleton, the components are covered and protected from weather elements and corrosion. This stage includes painting and using protective coatings such as anti-corrosion and moisture insulation.

Abu Kamal Bridge
Syria

Metal Bridge Structures

Metal bridges play a vital role in road and rail transportation, making them one of the most commonly used types of metal structures. Various types of metal bridges are constructed, each designed for a specific application. Metal bridges can be installed in urban areas or on intercity routes. The application and installation location of a metal bridge significantly influence its design.

History of Metal Bridges

Metal bridges, like most metal structures, gained popularity after the development of the steel industry in the mid-19th century. It is noteworthy that the first metal bridges were made of iron, and with advancements in metal industry, the use of steel for their construction became more common. The Clark Bridge in Britain and the Brooklyn Bridge in America can likely be considered among the earliest examples of modern metal bridge structures.

Types of Metal Bridge Structures

- **Beam Bridges:** These bridges consist of horizontal metal beams that rest on supports or piers. Beam bridges are typically suitable for short to medium spans and are popular due to their simplicity in design and construction.

- **Truss Bridges:** Metal truss bridges are made up of triangular-shaped metal members that connect to form a strong and stable structure. These bridges can carry greater loads compared to beam bridges and are suitable for medium to long spans with more complex designs.

- **Arch Bridges:** Arch bridges consist of one or more metal arches that uniformly transfer the weight of loads to the foundations. Due to their attractive design and capability to carry heavy loads, they are commonly used in constructing large and famous metal bridge structures.

- **Cable-Stayed Bridges:** Cable-stayed bridges consist of one or more vertical masts and tension cables that connect the masts to the bridge deck. This type of bridge is suitable for very long spans and is used in large, iconic projects due to its modern and aesthetically pleasing design.

- **Suspension Bridges:** These bridges comprise one or more main cables and secondary cables that convey the loads of the bridge deck to the main towers. Like cable-stayed bridges, they are suitable for very long spans and are utilized in major and special projects.

Metal Bridge Structures

Components of Metal Bridge Structures

- **Deck:** The deck of the bridge is the part where traffic, including vehicles and pedestrians, moves.
- **Beams:** Beams are the horizontal elements of the bridge that transfer the loads from the deck to the supports.
- **Piers:** Piers are vertical structures that carry the loads transferred from the beams to the foundations.
- **Abutments:** Abutments are the end points of the metal bridge structure that transfer loads to the ground and prevent deformation and settlement.
- **Cables:** Cables are used in suspension and cable-stayed bridges, transferring the loads from the deck to the towers.
- **Towers:** Towers are used in suspension and cable-stayed metal bridges and serve as the connection points for the cables.
- **Braces:** Braces are diagonal components that enhance stability and prevent deformation in the metal bridge structure.
- **Connections:** These are used to join various components of the metal bridge structure together and can be either welded or bolted types. Welded connections are for permanent joints, while bolted connections are for temporary and removable joints.

Important Points about Metal Bridges

- **Inspection and Quality Control:** Metal bridges are structures where quality inspection is of utmost importance. Ensuring compliance with standards at all stages of bridge construction and installation is crucial, as even the smallest error or flaw at any stage can lead to irreparable damage.
- **Testing and Commissioning:** The most critical phase after installing the metal bridge structure involves conducting tests and necessary inspections to ensure the bridge's load-bearing capacity. A suitable metal bridge should be able to sustain the required weight without any issues.
- **Ensuring Component quality:** Regular inspections can ensure the quality of bridge components. If any defects or failures are detected, immediate action should be taken to stop its usage and repair or replace the affected parts. Otherwise, the likelihood of unpleasant incidents occurring will be higher than before.
- **Monitoring Environmental Changes:** Environmental events and climatic changes, such as winds, storms, or earthquakes, can damage metal bridge structures.

  Therefore, it is essential to consider environmental changes and conditions as much as possible for the bridge and take them into account during the manufacturing and installation process.

Examples of Metal Bridges Worldwide:

Suspension Bridges:

Brooklyn Bridge in New York, USA

Golden Gate Bridge in San Francisco, USA

Tsing Ma Bridge in Hong Kong

Arch Bridges:

Sydney Harbour Bridge in Sydney, Australia

Truss Bridges:

Forth Bridge in Scotland, UK

Eads Bridge in St. Louis, USA

Cable-Stayed Bridges:

Millau Viaduct in France

Erasmus Bridge in Rotterdam, Netherlands

Beam Bridges:

Trent Bridge

Mark Bridge in England

Tory Bridge in Scotland

Metal Bridge Structures

Pipe Rack Structures

A pipe rack is a type of safety equipment that significantly enhances work efficiency. In other word, a pipe rack is a metal or concrete structure composed of various components that, after being connected, serves to protect pipes by supporting them. Generally, pipe racks are utilized in locations with numerous piping systems for transporting gases and liquids where protection is crucial. These structures are typically made of steel and are usually installed at various heights to facilitate access to pipes and cables.

Advantages of Pipe Rack Structure
Increased Safety
Pipe racks help reduce the risk of falling and damaging equipment by maintaining and supporting pipes and cables. This is especially important in industrial environments with a large number of pipes and cables.
Better Coordination of Equipment
The use of pipe racks allows better organization of pipes and cables. This not only helps improve the appearance of the work environment, but also makes access to equipment easier.
Reducing Maintenance Costs
Pipe racks help reduce maintenance and repair costs by maintaining and supporting pipes and cables. This is especially important in large projects with a large number of pipes and cables.
Increasing the Longevity of Equipment
Pipe racks help to increase the useful lifespan of these equipment by preventing damage to pipes and cables. This is especially important in industrial environments with harsh working conditions.

Applications of Pipe Rack Structures

Pipe racks play a crucial role in the oil, gas, petrochemical, and refinery industries by supporting and maintaining pipes and cables. These metal structures have evolved over time to meet industrial needs and technological advancements. The increasing demand for oil and gas has significantly heightened the need for efficient and safe transportation systems for these materials. During this period, the use of pipes and cables for transporting oil, gas, and chemicals became widespread.

- **Oil and Gas Industries:** Pipe racks are used in the oil and gas sectors to support and maintain pipes that transport oil and gas. These metal structures contribute to the safety and efficiency of transportation systems.

- **Petrochemicals and Refineries:** In petrochemical plants and refineries, pipe racks support and maintain pipes and cables that transport chemicals and petroleum products.

- **Power Plants:** In power plants, these metal structures are utilized to support and maintain pipes and cables that carry water, steam, and electricity. This enhances the efficiency and safety of energy production systems.

- **Food and Pharmaceutical Industries:** In the food and pharmaceutical sectors, pipe racks are used to support and maintain pipes and cables that transport food and medicinal materials. This aids in improving hygiene and safety during production processes.

Concrete Pipe Racks

Difference Between Metal and Concrete Pipe Racks

As it's obvious, the primary difference between these two structures lies in the materials used for their construction. Metal pipe racks are made from steel, which results in a relatively higher price and greater strength. The overall structure of metal pipe racks is completely metallic, although concrete may be used in their implementation. In contrast, concrete pipe racks are produced at a lower cost but have less strength compared to metal structures.

Components of Pipe Racks

- **Beams and Columns:** Beams and columns are the main components of a pipe rack, arranged vertically and horizontally to form the primary structure. These components are made of steel and produced in various cross-sectional shapes such as H, I, or L.

- **Braces:** Braces are used to enhance the strength and stability of the structure. These elements are typically installed diagonally to prevent deformation and instability.

- **Clamps and Supports:** Clamps and supports are used to connect and maintain pipes and cables to the pipe rack. These components are usually made from steel or aluminum and are produced in different sizes and shapes.

- **Bases:** Bases connect the pipe rack to the ground. These components are typically made from concrete or steel and bear the loads imposed on the structure.

Price of Pipe Rack Structures

Determining the price of pipe racks, like other metal structures, depends on several factors, including:

- **Design and Complexity of the Structure:** The design and complexity of the pipe rack influence its price. Simple structures with fewer beams and columns cost less than more complex designs that require more components. Additionally, the need for more braces to increase structural strength can drive up costs.

- **Dimensions and Size:** The dimensions and size of the pipe racks are crucial factors affecting the price. Larger structures with greater height and length require more raw materials, increasing construction costs.

- **Material Quality:** The raw materials used in constructing pipe racks are significant factors that influence the price. Normal steel, stainless steel, and aluminum are materials that vary in cost. Using stainless steel or aluminum leads to higher costs due to their enhanced resistance to corrosion and rust compared to regular steel.

- **Type of Connections:** The type of connections used in building the pipe rack also affects its price. Using bolted or welded connections incurs different costs. Bolted connections generally costing more due to their ease of installation and the possibility of disassembly.

- **Protective Coatings:** The application of protective coatings such as hot galvanizing, corrosion-resistant paints, and anti-rust coatings can increase expenses. While these coatings help extend the lifespan of the pipe rack and reduce maintenance costs, they raise initial expenses.

- **Transportation and Installation Costs:** Transportation and installation costs can also influence the final price of the pipe rack. Depending on the project's location and distance from the production site, transport costs can vary significantly. Furthermore, the need for specialized equipment for installation, such as cranes and skilled labor, can contribute to higher costs.

Sandwich Panel

The sandwich panel is a compound material which is produced in the form of sandwiches (layers) that the external layers are made of sheet metal (PPGI, Aluzinc or Aluminum) and also has a core made of polyurethane foam with different densities which is injected between two layers of the sheet.

This type of material is used to cover the Roof and wall of industrial halls, factories, production halls, warehouses, prefabricated buildings, portable cabins, cold storages, clean rooms, camps, temporary accommodation, etc.

Sandwich Panel

Sandwich panels are the best material of their kind in terms of lightness and insulation compared to similar covering materials. In addition to low weight and speed of execution, this product is more economical than other materials and meets all energy storage standards.

The trapezoidal shape of the roof sandwich panel and its overlap on each other will cause it to be completely sealed and there is no need to be sealed. It will be fixed only with special screws and gaskets.

The use of sandwich panels as roof and wall coverage is a suitable option for construction in earthquake-prone areas along with strength due to its lightweight.

One of the important features of polyurethane sandwich panels is their insulation against temperature and the lowest temperature transfer coefficient. For example, the temperature transfer coefficient of a 5 cm thick sandwich panel is equivalent to a 172 cm thick brick wall due to its extremely low heat transfer coefficient, which will lead to energy savings and reduced costs in the long run.

Key features and important reasons for using Sandwich panels include the following advantages:

For over 30 years, we have consistently utilized the most up-to-date and advanced production technologies to consciously produce Mammut sandwich panels to the highest standards.

We take pride in being market leaders, having not only met the extensive needs of domestic markets but also compeleting national projects in our beloved Iran, while achieving successful export experiences to many neighboring countries and across the Middle East.

Choosing the color of a sandwich panel is based on the client's preferences and in some cases may relate to the organization's logo. Occasionally, ceilings may be covered using two different colors. However, the most commonly used colors are as follows:

Roof Sandwich Panel

Roof sandwich panels are used to cover the roof of industrial halls, agricultural halls, warehouses, factories and so on. In addition to covering the roof and ceiling, thermal and refrigeration insulation, ease of implementation and installation, and most importantly, the short operation time of this product as the remarkable advantages of this product, has drawn the attention of many factories, companies and managers.

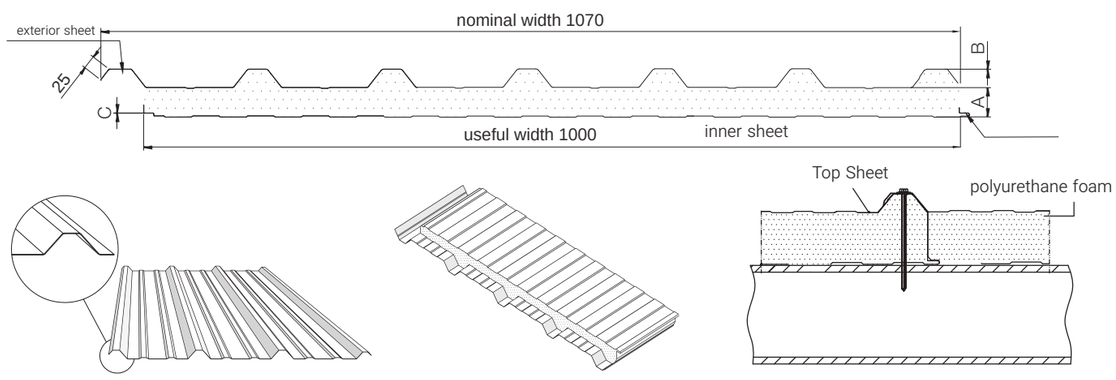
Roof sandwich panels should be designed and manufactured in such a way to be resistant against various factors such as sunlight, snow and rain, humidity and various ambiances. Regarding the low thermal conductivity of Roof sandwich panels, they are the best solution for energy management in closed spaces, so the most important factor in choosing their type and thickness is the regional climatic conditions.

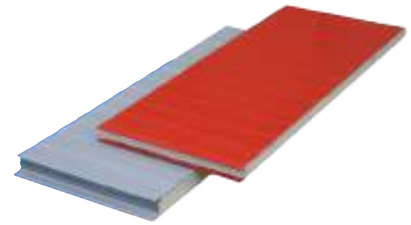
With the advancement of technology, it is possible to produce sandwich panels in different colors, which has greatly contributed to the beauty of structures, and has made this product welcomed by architects.

Mammut Company manufactures roof sandwich panels with a trapezoidal shadowline design on the outer sheet surface. Also, this company is the only manufacturer of roof sandwich panels with the ability to produce left and right overlaps.

The overall width of the roof sandwich panels is 1.07 meters and the useful width is 1 meter. Excellent overlap of this type of Mammut sandwich panels is such that it causes complete sealing and beauty of the structure surface.

Roof Sandwich panel-Technical Specifications
Overall Width (mm)
1070
Useful Width (mm)
1000
Length (m)
2m up to 13.60 (according to the order)
Density (ASTM 1622)
40±2 Kg/M³
Thickness (mm)
20-30-40-50-60-80-100-120 mm
Flammability range (DIN 4102)
PUR (B3), PIR (B2 , B1)
Type of external coverage
Both sides sheet, one side sheet & one side AL foil
Type of sheet
PPGI, Aluzinc, Aluminium
Upper sheet thickness (mm)
₀/4 - ₀/5 - ₀/7
Lower sheet thickness (mm)
₀/4 - ₀/5 - ₀/7





Wall Sandwich Panel

Wall sandwich panel is a type of building material that consists of two layers of sheets and injected foam between them, and is used to cover the wall and facade. This type of sandwich panel is used for exterior walls as well as interior partition walls. Wall Sandwich panels usually have grooves that are created due to the greater strength of the sheet as well as better adhesion of foam to the sheet.

One of the unique features of wall sandwich panels is their simple and quick assembly. Also, due to their cost-effectiveness and easy installation, high load bearing, lightness, excellent against fire and other natural disasters, along with maintaining hygienic standards and compatibility with the environment, cause their use in covering exterior and Interior walls of halls, warehouses, shops, department stores, warehouses, garages, cold stores for fruits and vegetables, booths, livestock and poultry farms, industrial halls and factories, etc.

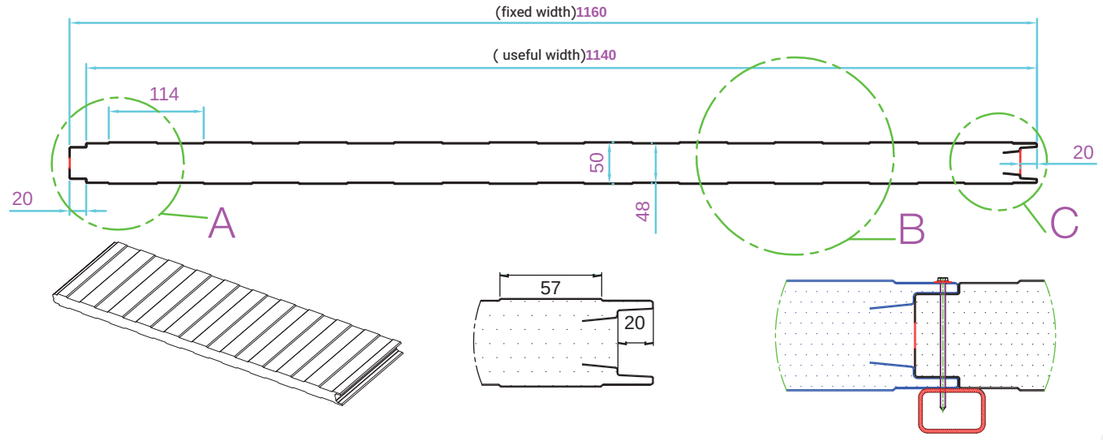
The way that sandwich panels are connected provides the tongue and groove of each sandwich panel and its function is such that it has an indentation on one side and a protrusion on the other side which causes overlapping of the edges of each other as the two panels are placed next to each other and can be screwed to connect to the structure in different positions.

Wall Sandwich panel-Technical Specifications
Overall Width (mm)
1160
Useful Width (mm)
1140
Length (m)
2m up to 13.60 (according to the order)
Density (ASTM 1622)
40±2 Kg/M³
Thickness (mm)
30-40-50-60-80-100-125-150mm
Flammability range (DIN 4102)
PUR (B3), PIR (B2 , B1)
Type of external coverage
Both sides sheet, both sides nylon
Type of sheet
PPGI, Aluzinc, Aluminium
Upper sheet thickness (mm)
₀/4 - ₀/5 - ₀/7
Lower sheet thickness (mm)
₀/4 - ₀/5 - ₀/7

Types of Wall Sandwich Panels:

1) Flat 2) Lined (grooved) 3)Microwave 4) Secret fix

In the secret fix sandwich panel, as its name implies, the screw due to the cross section is not visible. the Secret fix sandwich panel is manufactured as a part of a standard wall sandwich panel, and the only difference is that the cross-section is hidden as a cover to hide the screws and joints.



Flashing Sheets

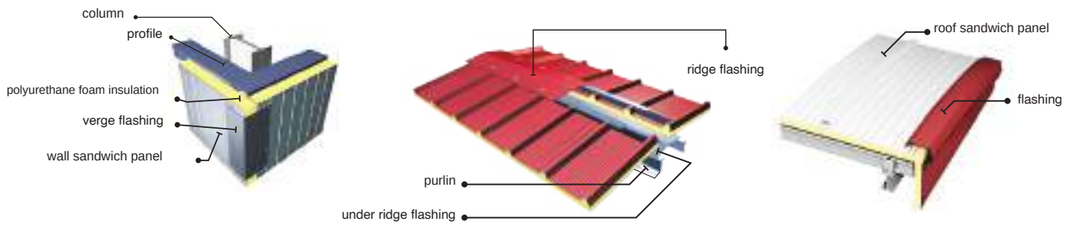
Flashing is a low-thickness painted sheet that is used to seal corners, joints, sides, etc. Flashing sections are different in each project and are designed and produced based on the desired structure. Fashing is connected by rivets.

A flashing sheet is used as a cover for certain parts of a building such as window frames, wall edges, sloping ceilings, etc., which in addition to creating beauty and strength, also covers the remaining joints from the sandwich connection of roof or wall panels.

Flashing is installed at the junction of walls and ceilings in a way that helps to prevent the penetration of water, air and dust while hiding the seam between them. These coatings are produced in different shapes and sections, depending on the needs of the project.

For example, crown flashing is used to cover the top of roof sandwich panels, subfloor flashing is used to cover the bottom seam of roof panels and corner or frame flashing are used to cover the connection of panels and their sealing.

Flashing sheets are usually made of ordered sandwich panel sheets, including: Galvanized, Aluzinc and pre-painted Aluminum in thicknesses of 0.4, 0.5 or 0.7 mm, which are produced in different applications.

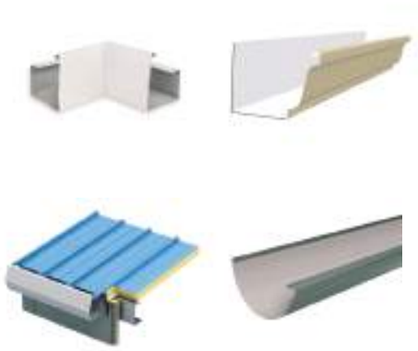


Gutter

A Gutter is a prefabricated channel made of sheet metal for collecting and directing surface and spilled water from a sloping roof to water transfer pipes, which are responsible for exiting and directing water to wells or channels.

Using the gutter is very important because it helps to prevent the leakage of rainwater to the walls, the leakage of moisture to the foundation, and to maintain the strength of the structure.

To produce gutters, galvanized sheets with a thickness of 2 mm are used, because the connection of gutter sections in long lengths requires all-round welding to connect them completely. The gutter also has different sections that can be produced in different sections and dimensions depending on the needs of the project.



Installation and Execution of Sandwich Panel

Before purchasing a sandwich panel, it is necessary to make an accurate engineering estimate of the required components, especially the amount and dimen-sions of the sandwich panels for ceilings, walls and flashing.

For this reason, conduct a visit and match the plans with the executed structure while reviewing the project plans, prepare shop drawings in AutoCAD software and inform the production unit about the details.

Shop drawing refers to the plans that are prepared before the production of sandwich panels and include the specifications, size and dimensions, length and number, placement of panels on the facade and the materials used.

Structural maps are prepared and sent to the factory for production after the approval of a consultant or supervisor.

The sandwich panel installation is very fast in terms of time and the project is ready for a short time.

Roof Sandwich Panel Installation

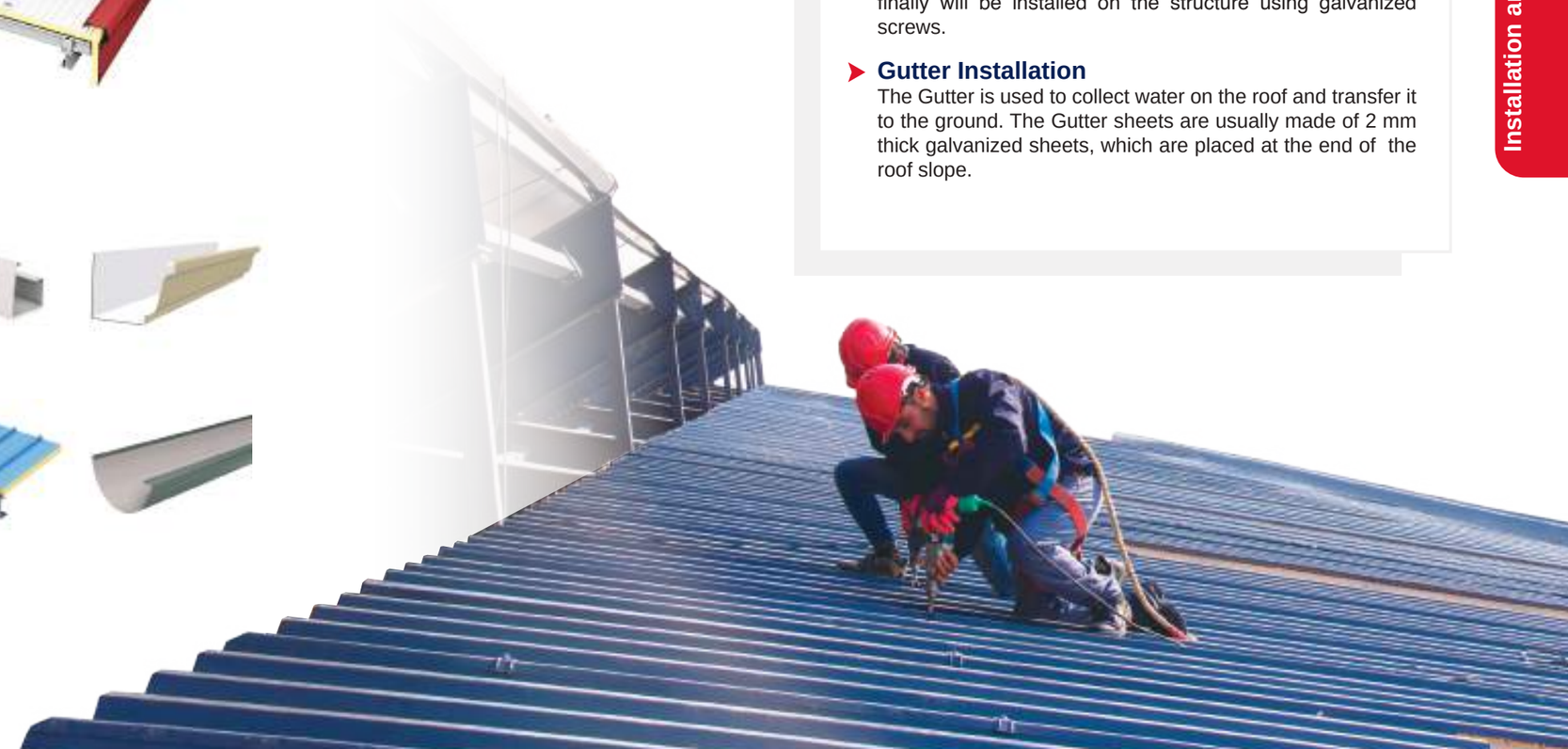
Roof sandwich panels are installed parallel to the outer side of the roof and on the roof profiles (Purline) by galvanized and screwed top screws, and due to the production section of the roof panels (trapezoidal and stepped), the panels are completely sealed.

Wall Sandwich Panel Installation

To install wall sandwich panels, it is necessary to do the supportive back frames using industrial profiles. The dimensions, cross-section and size of these profiles depend on the amount of wind load, its direction and the height of the structure. Wall panels will generally be installed vertically and supportive back frames will be installed horizontally and finally will be installed on the structure using galvanized screws.

Gutter Installation

The Gutter is used to collect water on the roof and transfer it to the ground. The Gutter sheets are usually made of 2 mm thick galvanized sheets, which are placed at the end of the roof slope.



Warehouses

Nowadays, the speed of construction and cost-effectiveness of any structure that is used in warehouses to store a variety of products such as agricultural, food, dairy, pharmaceutical, health, cellulose, chemical, industrial, military or maintenance of equipment, devices and industrial tools is very importent. Since the construction of such structures is usually being done by using steel, the use of methods is important that meet the required standards, to make the structure lighter and speed up finishing work, which ultimately helps to make the structure more affordable.

It is obvious that the use of sandwich panels in covering the walls and roof of the structures is much lighter than the use of conventional building materials such as brick or concrete. And significantly prevent insect penetration into them, and bacteria and fungus growth. The approach of using sandwich panels to cover the walls and roof of the structure has become common.

The use of wall sandwich panels instead of traditional materials, despite raising health standards, increases the optimal use of available space as well as warehouse shelving, and the structure of the sandwich panel protects goods from bad weather conditions such as snow and rain, cold and heat weather, wind and storm.

Mammut Structures & Panel Company can to produce sandwich panels for warehouses with the ability to be sterilized and completely hygienic with both sides flat type wall panels to prevent the growth of bacteria. Also, it can cover structures with different uses, including gyms, shops, repair shops, halls, factories and industrial workshops, aircraft hangars, poultry and livestock farms, parking lots etc.

- Vitana Project
(Caspian Industrial district)
Qazvin

- Segments Warehouse
Karaj

- Restaurant Hall
Karaj

- Oil Company Project
Qazvin

- Iran Khodro Project
Tehran

- AGT Project
Isfahan

Malard Mushroom Project
Karaj

Shenzar Industrial Complex
Tehran

Production Halls with Special Conditions

The process of production and preparation of some products should be done in halls with very humid conditions and special standards, some of which can be mentioned as follows.

Mushroom cultivation hall, special food and dairy production halls, special petrochemical production halls copper ingot production halls and some chemical industries due to special acidic or alkaline conditions, slaughterhouses, poultry slaughterhouses, sports halls, saunas, flower and plant breeding halls.

These conditions create challenges such as maintaining and controlling the required humidity, wear and tear of walls and ceilings in humid environments, frequent washing and cleaning of the work environment, severe corrosion of walls and ceilings; and many other problems for employers, designers and builders.

Mammut Structures & Panel Company has been able to entirely resolve the mentioned issues by producing very special sandwich panels for ceiling and wall using modern plastisol technology which is tailor-made to such wet halls.

Clean Room

A clean room is an environment in which the standards for controlling the amount of environmental pollutants have been observed, to conduct special scientific research or produce very sensitive equipment.

In sensitive and strategic industries such as nuclear industries, pharmaceuticals, medical equipment, electronics and microelectronics industries, aerospace, food or hospitals, the amount of environmental pollutants including dust, aerobic microbes and suspended chemical vapors should be at a low level and be kept in a controlled manner and be much lower than the usual space of a closed environment. It is also necessary to control other environmental conditions, including humidity, cold, heat and even pressure.

One of the main requirements of the components that make up clean rooms is covering the roof and walls using special sandwich panels, which should make cleaning easier by creating a completely smooth surface while preventing the accumulation of bacteria and microbes. This type of sandwich panel should have maximum resistance to corrosion and chemicals.

At present, Mammut Structures & Panel's clean room sandwich panels are the most unique modern building materials and the main choice of clean room designers and builders, following the highest quality standards of raw materials and production.

Cold Storage Sandwich Panel

Cold storage is a closed and isolated space whose temperature and humidity are carefully and continuously controlled. They are used for freezing and storage of various ingredients such as food, meat, poultry, fish, dairy, fruits and vegetables as well as electronic equipment, medicine, chemicals and pharmaceuticals.

Depending on the dimensions, the amount of loading, the type and storage duration of the product and the capacity of the cold storage, the power of the compressor, condenser and evaporator changes accordingly. Note that cold storages operate on a compression refrigeration cycle and depending on the required capacity, it can be of Freon or Ammonia, depending on the required refrigeration capacity.

To prevent energy loss, all aspects of the cold storage room including walls, ceiling and floor must be insulated during the manufacturing process. The type and thickness of insulation have an important effect in preventing energy loss and increasing the life cycle of the refrigeration system, and thus preventing spoilage and deterioration of stored products.

For storage of fruits and vegetables or short-term storage and distribution of meat, a refrigerator above zero is usually used. Since one of the most important required features of any cold storage is the low heat exchange rate with the outside environment, using sandwich panels made of the best polyurethane insulation with tongue and groove structure that completely aerates the environment as well as special refrigerator doors are also very important.

Employing up-to-date facilities in Mammut Structures & Panel Co., we are able to produce all types of fiber glass refrigerator doors by producing special sandwich panels for cold storages and with remarkable technical specifications.

- Agricultural Products Cold Storage
  Sorkhab

- Meet Cold Storage (Sibnoosh)
  Kordan

- Agricultural Products Cold Storage
  Karaj

- Cold Storage (Fartak Ghasr Jam)
  Isfahan

Why are technical specifications important in choosing a sandwich panel?

At first glance, all the sandwich panels look the same. However, considering that sandwich panels are in the category of capital goods, the longevity and preservation of the characteristics that have made customers choose the sandwich panel as a construction material, is very important.

About Sheets Specifications:

Which factories are the manufacturer of the sheets? and what are the standards?

What is the thickness range of sheets? And what are the tolerance standards?

Since the amount of zinc coating (ZN) of PPGI sheets or the amount of coating of zinc, aluminum and silicon of Aluzinc sheets is completely related to the crushing time of the sheets, this amount of coating is very important and finally it is related to the longer life of the product.

Another important point is the material and thickness of the Super Polyester paint (top coat). Obviously, using a super polyester coating instead of a polyester coating makes a significant difference in the amount of paleness over time and also helps the product to last longer.

The mechanical strength of a sandwich panel is completely related to the number and height of ribs that have been formed on its sheets, so it is very important to pay attention to the production plan's technical features and how the overlaps are other factors that help to maintain the ambient temperature.

About PU Foam Specifications:

Since the formation of a polyurethane foam that causes thermal insulation of a sandwich panel, raw materials such as polyol and isocyanate, the manufacturing completing additives, pentane gas, glue, etc. are needed. It is very important that in which factory and country these raw materials are made in, because when the main bases of the polyurethane foam production are from low-quality materials, it will eventually cause the loss of the final product and the following issues.

- Creating cracks and breaking the foam
- Inflating the sandwich panel
- Shrinkage of foam
- Separation of polyurethane foam from the sheet and.....

It is an honor that Mammut Structures & Panel Co. has managed to lead the industry in producing sandwich panels in the country by adhering to the highest related standards and utilizing the finest raw materials and the latest global technologies. It has turned the slogan “Experience the Best” into a reality.

Types of Sheets Used in the Production of Sandwich Panel

One of the main components of a sandwich panel is a sheet that is placed on both sides of the sandwich panel. This sheet is made of different types of steel with different grades, which are produced by hot rolling mills in steel mills. The percentage of chemical elements forming the alloy of the sheet causes mechanical strength and high formability of the sheet. For this reason, the use of these types of sheets in the production of prefabricated structures and sandwich panels is very common.

Selecting the type of coating on the surface of sandwich panel sheets depends on environmental factors such as the type of climate of the region in terms of humidity, snow and rain, corrosion rate, altitude, temperature and amount of sunlight in the area where the project is to be built. It also depends on the type of activity or operation carried out after the construction of the project. The sheets used in producing sandwich panels are Galvanized, Aluzinc, Aluminum and Steel.

Galvanized and Aluzinc Sheets

The main material of both sheets is carbon steel, but the plated alloy coating on them prevents oxidation and rust in wet and rain-prone conditions.

The difference between an Aluzinc sheet and a galvanized sheet is in the elements that form their coating. the Galvanized sheet has a plated coating of more than %98 zinc metal, but Aluzinc sheet is made of %55 aluminum, %44 zinc and %1 silicone with a plated alloy coating.

It should be noted that despite the material of the coating, the weight of the coating and its thickness are also very important. According to the standard, the weight of Aluzinc or Galvanized metal coating should not be less than 100 g / m2. The higher the coating mass, the higher the corrosion resistance. This amount of coating protects the sheet from corrosion factors such as moisture and corrosion and increases the life of the sheet and thus the product of the sandwich panel.

Sandwich Panel Paint Coating

Galvanized sheets, Aluzinc etc. should be included in the coil coating process. This coating is a type of super polyester resin with high durability and stability with a thickness of 25 microns (5 microns primer + 20 microns surface coating). This paint has a very high durability and appearance stability, which increases the resistance to UV, corrosion resistance and chemicals in this product.

Also, for better adhesion, a 7-micron primer coat of epoxy primer called BACK COAT is applied, with the ability to foam at the junction of the sheet with polyurethane foam.

Plastisol Sandwich Panel

Some products are produced in halls that may have very humid conditions, or acidic or special environments. In these cases, it is necessary to use sandwich panels to cover the ceilings and walls of their production halls, which are much more durable than Galvanized or Aluzinc sandwich panels.

Production halls such as mushroom production halls, copper ingot production, some petrochemical products, special food production, dairy products etc.

It is necessary to use coatings that have maximum resistance to corrosion to make such environments. These conditions create challenges such as severe corrosion of walls and ceilings, maintaining and controlling the required humidity, wear and tear of walls and ceilings, constant washing and cleaning of the work environment, and many other problems for designers and builders of production halls.

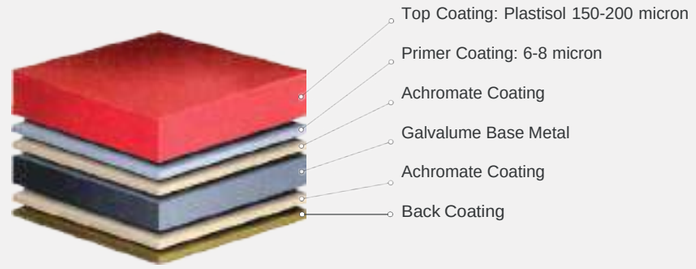
The Mammut has been able to eliminate all these concerns by producing very special ceiling and wall sandwich panels with special technical specifications and using Plastisol technology, which is specific to wet halls and acidic environments.

Plastisol is a type of organic polymer coating (paint) based on polyvinyl chloride (PVC) thermoplastic polymer, which is applied in 150 to 200-micron thickness on alloy sheet metal coil sheets.

This type of sheet is being used in roof and wall sandwich panels, in cases where a sandwich panel with higher strength and better performance is needed against atmospheric conditions and environments that need high corrosion resistance.

Advantages of Plastisol Sandwich Panels

- High resistance to certain acidic, special atmospheric and humid environments with high corrosion.
- Resistant to scratches and surface injuries that can cause possible damage to the sheet surface.
- Resistant to sunlight for a long time and prevent paint damage.
- Excellent coverage quality



Mammut Structures & Panel Co. is proud to assist its customers in making the right choices by offering specialized consultations and, if necessary, on-site project visits based on the precise needs of its clients

Polyurethane

Polyurethane foam is a very strong insulator, which is produced from the combination of polyol and isocyanate under special conditions and in the presence of a catalyst and other cases, where most of the cells are closed, then for this reason, it has very good efficiency as a thermal insulator.

Hard polyurethane foams are one of the most popular insulators. These foams can significantly reduce energy costs due to their ability to maintain a uniform temperature, and are also highly resistant to impact wear and cracking, which ultimately make industrial, commercial and residential environments more efficient and comfortable.

The core of the sandwich panel is the injection foam between the sheets, which is called polyurethane. The insulation used in sandwich panels is hard polyurethane, which makes sandwich panels one of the best thermal insulators, so that the heat transfer coefficient in a sandwich panel with a thickness of 5 cm is approximately equal to the heat transfer coefficient in a brick wall with a thickness of 172 cm.

The choice of polyurethane foam in sandwich panels completely depends on the thickness, type of application, the possibility of fire, etc., so it is necessary to be familiar with the following concepts about polyurethane foams used in sand- wich panels:

Density

Density means measuring the amount of some physical properties (usually mass) per unit length, area or volume. The density or mass density of an object is directly related to its mass. That is, the heavier the body, the higher its density. The higher the density of polyurethane foam, the heavier it is and the higher its strength, because of the less space between its constituents and the more compact it is.

PUR & PIR Polyurethane

Rigid Polyurethane or PUR for short, has been used in the construction industry since the 1960s as a high -performance insulation material. Industrial development in Europe and the United States led to the production of the second generation called Polyisocyanurate or PIR.

Class of Fire

To facilitate prevention, fires are classified according to different standards. Fires are divided into different classes of fire according to the nature of the fuel, one of them is class B, which is divided into three groups: B3, B2 and B1, and have 3 to 1 more resistance to fire.

Features of PIR sandwich panel with B1, B2 fire grade include the following:

- Self-extinguishing behavior and preventing the spread of fire.
- The initial temperature required for PIR to ignite is higher than PUR.
- During burning, the droplets and particles do not ignite and do not spread the fire.
- The PIR is extinguished immediately by removing the direct flame, thus preventing the spread of fire.
- It ignites very late after direct flame contact, while EPS polystyrene or other organic insulators ignite much sooner.
- **B1 foams have greater resistance to fire initation and spread compared to B2 foams.**

Mammut Structures & Panel Co. while producing PUR sandwich panels, is proud to be the first producer of PIR (**B1, B2)** polyurethane sandwich panels with B2 fire grade in our country.

مهرسا شیمی فرتاک

Lab address	Mehrsa Chemie Fartak Co., Hashtgerd			
Applicator	Mammut World Co.			
Company Address	Karaj Qazvin highway- 5 km after Kordan Bridge- Mammut Industrial Town- Mammut World Company			
Sample Name	Sandwich Panel with Polyurethane Foam Core			
Environmental Conditions	Temp: 23±2	Moist: 50±5	Sampling has been done by the customer	Page No.: 1 from 1

Test Results Report	
Report Serial No.	L-280-08-02
Report submission date	2023/11/04
REV No.	-
Appendix	-
Date Of Sample Receipt	2023/10/24
Date of Confirmation done	2023/11/01
Letter No. of Customer	2023/10/22
Customer Form Code	L-F-01-708

Test Results

Fire Behavior:

- The sent sample is B2 type and fire resistant.
- According to the standard, the duration of exposure of the sample to the flame is equal to 15 seconds.
- The height of the flame was less than 100 mm.
- Before performing the test, the sample was kept and stabilized for 48 hours in the standard conditions of the laboratory environment Temp 2±23 C and Relative humidity 50±‰5 according to the standard.
- The test was carried out on a test specimen.
- The thickness of the sample is less than 70 mm.
- Sample produces little smoke.

Test Results

Flammability Test	
Method of Test	ISIRI4-7271
Method of Preparing Tests	Has been done by Customer
Test Device Code	L / E 02
Number of Tests	1

Tested B3 Product Sample

Tested B2 Product Sample

Notice:

Test report is just valid for the tested sample. The above report only shows the sample under test. Any copying of the test report without written permission from Mehrsa Chemie Fartak Laboratory is prohibited, and in case of consent, it must be in full and from all pages. This laboratory is not responsible for any matching the name of the sample with the tested part.

مهرسا شیمی فرتاک

Laboratory

In order to improve the quality of products in Mammut Structures & Panel Co. and achieve the highest quality in the country, the establishment of a subspecialty laboratory center with the use of academic and experienced personnel was on the agenda of the Mammut Company. In this regard installation of the most advanced and up-to-date polyurethane foam testing machines as well as testing machines for various types of sheets, necessary actions were taken and laboratory units started operating by valid international standards.

Polyurethane foam thermal conductivity measurement test according to ASTM C518 standard

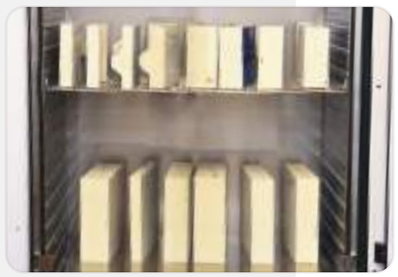
In order to check and determine the thermal conductivity coefficient of the foam sample at a fixed and specific temperature according to the standard to calculate the heat transfer in the sandwich panel

Polyurethane foam flame behavior test according to DIN 4102 standard

The slow-burning or fast-burning reaction of sandwich panel foam flaming against direct flame and evaluating the extent of fire spread to determine the fire resistance class of foam.

To measure the adhesion strength of sheet to foam according to ASTM D1621 standard

Evaluation of the non-separation of the sheet layers from the foam in sandwich panel using a tensile test device and determination of adhesion strength in terms of kilopascals.



Dimensional stability measurement test of sandwich panel in different environmental conditions in terms of temperature and humidity according to ASTM D2126 Standard (Aging Test)

Studying and simulating the perfor- mance of panels in the long term to evaluate the lifespan and not to observe dimensional changes of them in different conditions in terms of temperature and relative humidity of the environment.

EST RUB MEK for coating resistance against chemicals based on ASTM D5402 standard

The resistance of the paint film to the solvent (Ethyl Methyl Ketone) with ASTM D5402 standard.

Laboratory

Gloss control based on ASTM D523 standard

Determining the gloss level of the coating using a gloss meter accord- ing to ASTM D523 standard.

Moisture resistance test based on ASTM D2247 standard

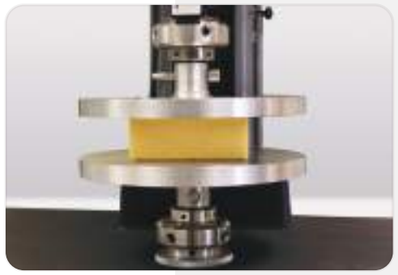
Determination of 100% moisture resistance is done by placing the sheet sample in the device for 1000 hours in accordance with ASTM D2247 standard in an enclosed chamber containing a heated mixture saturated with air and water vapor. Typical temperature at 100 degrees Fahrenheit (38 degrees Celsius) is maintained.

Cupping test based on EN ISO 1520 standard

Evaluation of the resistance of the coating, against cracking or separation from a metal substrate in case of gradual deformation by indentation according to the EN ISO 1520 standard.

Compressive properties testing according to ASTM D1621 standard

The testing procedure for determining the compressive properties of rigid cellular materials, particularly expanded plastics. Rigid cellular, or foamed, plastics are manufactured in different forms for a variety of construction-related applications.



Color hardness control based on ASTM D3363 standard

Determining the hardness of paint using a pencil hardness tester to the resistance and flexibility of it against scratching, polishing, rubbing and other external abrasive forces.

The bending test based on ASTM D522 standard

Evaluation of coating resistance against cracking after bending

To determine the thickness of paint using a paint thickness gauge based on SSPC PA2 standard

Determining the thickness of dry paint film applied on Galvanized, Aluzinc and colored Aluminum sheets.

Paint adhesion test based on ASTM D3359 standard

Determination of film adhesion color using testing tools and equipment adhesion (TEST CUT CROSS) according to the ASTM B117 standard.

Salt spray test to determine the resistance of paint against corrosion based on ASTM B117 standard

Determining the amount of corrosion resistance by placing the sheet sample in the salt spray machine for 1000 hours

Resistance test based on ASTM D4587-11 standard

Determining the resistance to ultraviolet rays by placing the sheet sample in the UV device for 1000 hours according to ASTM D4587-11 standard.

Prefabricated Buildings and Containers

Modular prefabricated buildings and containers are initially produced after precise and systematic design by experienced experts and skilled technical personnel. The components of these buildings are fully manufactured in the factory and sent to the project site after passing through Mammut's seven-stage production process and final quality control. The main advantages of prefabricated building projects include:

- **High speed of construction**
- **Mobility capability**
- **Lightweight and earthquake-resistant**
- **More usable space compared to occupied area**
- **Adequate thermal and sound insulation**
- **Ability to be implemented in hard-to-reach locations**
- **Environmental compatibility**

Prefabricated Buildings

Prefabricated buildings represent a modern and innovative method in the construction industry. In this method, building components are produced in advance at the factory and then packed and transported to the final project site for installation. These components are typically manufactured as ready-to-assemble and portable modules, including most parts of the building, such as walls, roofs, windows, doors, and other equipment.

Constructing a prefabricated building drastically reduces the time required to build and complete a structure. Additionally, this method minimizes resource and material wastage due to the use of machinery and factory processes, greatly enhancing efficiency and quality.

Generally, prefabricated buildings are recognized as an innovative and effective solution in the construction sector, enhancing construction speed and quality, offering flexibility in design and functionality, and improving cost-effectiveness. This method has gained significant popularity in recent years and plays an important role in the transformation of the construction industry.

Prefabricated buildings have various applications and are often used as residential, office, and villa structures without limits on project size. In the past, most prefabricated buildings were constructed as single-story; however, Mammut Structures and Panel Company, relying on engineering capabilities and advanced production technologies, has managed to construct multi-story prefabricated buildings based on global standards, establishing itself as a leader in this industry.

Advantages of Prefabricated Buildings

Prefabricated buildings are recognized as a quick and to the efficient solution in the construction industry due to their unique advantages and characteristics compared to the traditional constructions.

Speed of Construction: One of the greatest advantages of prefabricated buildings is their rapid construction speed. The time required for producing building components in the factory is significantly less than the traditional methods. Furthermore, the installation of these components at the project site is also completed more quickly, significantly reducing the overall project completion time.

Traditional construction projects often face delays due to the adverse weather conditions, but since prefabricated buildings are produced in the factory, their construction is unaffected by the weather. Thus, the high speed of construction, installation, and operation minimizes the financial impacts caused by time and inflation, greatly supporting the project's profitability.

Cost Reduction: The reduction in production time for prefabricated buildings minimizes labor and energy costs. Additionally, the use of standardized and high-quality materials in the production process ultimately leads to decreased maintenance and repair costs over time.

High Quality: Due to the use of advanced technologies and maximum quality control during production at Mammut Structures and Panel Company, Mammut prefabricated buildings have a higher quality. These buildings are usually produced in compliance with national and international standards and are inspected for quality control, environmental compatibility, and safety.

Environmental Compatibility: Many materials used in the prefabricated buildings are recyclable, which helps to protect the environment. Furthermore, some of these buildings can be designed and constructed to allow for future relocation and reuse, leading to resource savings and reduced waste.

Flexibility in Design: Prefabricated buildings have a very high degree of design flexibility. These structures can be manufactured in various sizes and applications, designed, and produced according to the customer needs.

Reduced Energy Waste: Mammut prefabricated buildings are constructed using insulation materials like polyurethane and rock wool, which are significantly better than traditional materials and prevent energy loss, ultimately leading to optimized energy consumption in the buildings.

Increased Usable Space: The use of better insulated walls reduces the thickness of the walls in prefabricated buildings compared to masonry buildings, allowing for more usable space in these structures with the same area as traditional buildings.

Earthquake Resistance: Prefabricated buildings often utilize lightweight materials while adhering to standard construction principles, ensuring their resilience in critical conditions such as earthquakes.

Mobility Capability: Mammut prefabricated buildings are designed in a modular fashion and can be assembled and disassembled in the shortest possible time using linear, flat, and volumetric transportation methods.

Comparison of Prefabricated Building with Traditional Building

Feature	Prefabricated Building	Traditional Building
Construction Speed	Due to the pre-fabrication at the factory, production process is quicker.	All stages are carried out at the project site, requiring significant time.
Construction Quality	High quality control in the factory environment, with lower dependency on weather conditions.	Construction quality depends greatly on workers' skills and is affected by environmental factors
Cost Efficiency	Due to reduced labor needs and energy consumption in production, costs are lower.	High energy and labor costs, plus increased transportation expenses.
Design Flexibility	It allows for diverse and tailored design options.	This flexibility is limited in traditional buildings.
Strength and Durability	Controlled material quality and precise production enhance durability and resistance.	Average durability due to variability in materials and construction methods.
Environmental Impact	Prefabricated buildings have less environmental impact.	Traditional buildings typically have a larger environmental footprint.
Maintenance	Prefabricated buildings require less maintenance and repair.	Traditional buildings often need more maintenance.
Recyclability	Generally made of materials that can be recycled.	This option is not available in traditional buildings.

Today, due to various reasons, including lifestyle changes, shrinking family sizes, shortages of skilled labor, earthquakes damages, and environmental preservation, the construction industry is rapidly undergoing fundamental changes. To this end, Mammut Structures and Panel Company, as a leading company in the field of prefabricated buildings, relies on specialized human resources and utilizes the latest technologies, along with innovations in the design and manufacturing of its products, to play a significant role as a market leader in prefabricated buildings in Iran.

Smart Prefabricated Buildings

In recent years, the construction industry has shifted towards innovation and the use of advanced technologies. One of these innovations is smart prefabricated villas, which have created immense appeal for buyers and investors. Imagine a smart home where touch-sensitive keys and locks installed on the walls enhance your living environment's beauty. Electric curtains, steel and crystal switches, wall and ceiling speakers, remote security control for your villa, traffic control, and the ability to manage every aspect of your luxurious home through your smartphone—all designed and implemented to provide you with a unique experience that significantly enhances enjoyment and comfort.

Mammut's prefabricated villas are structures that are precisely designed in the engineering unit, produced in the Mammut factory, and then transported to the project site, freeing you from construction hassles. This type of construction, due to the factory quality control processes and rapid installation, is considered a modern and economical solution for creating living spaces. These buildings are designed and constructed without limitations on the use of modern construction materials, using the latest technologies and in accordance with global standards. Prefabricated villas are mainly used for personal purposes, specific startup environments, modern tourist accommodations, and more.

With over 30 years of experience in designing and constructing high-quality smart prefabricated villas, Mammut Structures and Panel Company offers a unique experience for its customers. These buildings utilize modern technologies and quality materials to provide a safe and ideal living space, making this modern and efficient solution appealing to buyers and investors in the construction and tourism industries.

Office Camps, Worker Camps, and Workshop Container Sets

In today's world, the usage of prefabricated and modular structures, especially in construction and workshop projects, has significantly increased. Workshop container sets and worker camps are among these structures that have garnered considerable attention in various projects due to their unique capabilities.

These office camps, worker accommodations, and workshop containers are designed for a variety of purposes, including worker rest buildings, sanitary facilities and bathroom, administrative and management units, meeting rooms, and more.

The office camps, worker camps, and workshop container sets built by Mammut Structures and Panel Company are designed and constructed to be highly efficient, cost-effective, lightweight, resistant to various weather conditions, and provide adequate thermal and sound insulation, ensuring a sense of comfort and tranquility.

The high speed of construction and installation of these units, along with their ability to be assembled and disassembled, make this method one of the best options for temporary and permanent camps and workshops.

Utilizing Mammut's workshop containers and worker camps is an effective and economical solution for meeting the needs of construction and industrial projects. These unique structures enable the creation of efficient and safe spaces for workers and managers, contributing to improved work quality, increased productivity in projects, and favorable economic conditions.

Bulletproof Containers

Today, the use of containers in various applications has attracted the attention of many organizations, which one of them is Mammut's bulletproof containers.

A bulletproof container is a portable and prefabricated structure designed to withstand bullet strikes using special materials and advanced technologies. These containers are typically used in areas of high security risk to protect individuals from shooting incidents.

The impermeability of the containers against bullets not only creates a safe environment for personnel on-site but also can have a significantly positive psychological impact on individuals, thus increasing their efficiency.

Locations that may require bulletproof features include police stations, military and security bases, police stations and public security, guard containers, embassies and consulates, and specific commercial and administrative buildings such as jewelry stores.

Mammut's bulletproof containers represent a novel solution for ensuring security, protecting individuals and property from various threats, and have received a positive reception in society due to their diverse applications, playing an essential role in maintaining safety across various communities.

Foldable Containers

One type of Mammut Structures and Panel's container is the foldable container, which is a specially designed product due to its unique engineering and design features. The main characteristics of these foldable containers are as follows:

- Due to the compact size of this product, it is possible to pack, store, and keep 300 folded containers in an area of 400 square meters.
- The compactness of this product significantly reduces costs related to loading, transporting the product to the site, and unloading, allowing for the transport of 10 foldable containers using a single 40-foot container.
- Thanks to correct engineering and quality manufacturing, the container can be collected and transferred to a new location without damage once work is completed.
- It only needs to be placed on a flat surface without any special foundation requirements.
- This product, constructed using Mammut polyurethane sandwich panels, is fully insulated against cold, heat, and moisture.
- The installation of foldable containers is very simple and quick, allowing for installation by two people within one hour. These features facilitate rapid establishment during emergencies and natural disasters.
- Due to the use of highly durable materials, there is no need for covered warehouses when storing this product.
- If larger spaces are required, multiple foldable containers can be installed next to each other to provide more space.

Diesel Generator Containers

As you may know, industrial generators fueled by various types produce a significant amount of noise during operating and regarding to the places which are installed and used, can disturb individuals in the surrounding environment.

Mammut Structures and Panel Company has engineered, designed, and constructed special containers that significantly reduce the noise pollution from diesel generators and utilize special cellulose filters to enhance the lifespan and proper functioning of the engines. These containers are popularly known as Mammut silent diesel generator containers; which is manufactured with sandwich panel and a special structure coated with polyurethane paint suitable for various weather conditions, effectively protecting the diesel generator from dust, rain, snow, and frost in the winter, which ultimately increases the device's longevity and efficiency.

Moreover, this container facilitates the transportation of diesel generators and increases the speed of restarting the device by up to %90 after physical relocation.

These cabins significantly reduce noise to a considerable extent due to their internal structure, use of neoprene materials, and sandwich panels for soundproofing. Mammut diesel generator containers are engineered and standardized to provide sufficient access from all four sides of the device for repairing and maintenance of the generator and its pipes, fuel charging, exhaust, and air ventilation, and radiator water supply. The design of this containers is such that, in emergency situations, the diesel generator can be easily removed.

Excavation Portable Cabin

Due to the special and unfavorable conditions of oil and gas wells, which are sometimes located in inaccessible areas on land or on platforms located at sea, it is necessary to have portable cabins that are produced in accordance with special international standards to have the maximum possible endurance in special climatic conditions, risk factors and etc. in the environment of oil rigs. Therefore, the general structure and technological specifications of this type of cabin are very different and more durable than conventional cabins.

Standard Portable Cabins located on the Site of Oil and Drilling Rigs include the following:

- The head of the well, company representative and camp manager portable cabin, sleeping cabin for 8 and 12 members, 4-bedroom guest cabin, gymnasium and geological cabin, toilets, kitchens, chapels, conservation and special portable cabins.
- Excavation portable cabin, is one of the special products of Mammut Structure & Panels Co., which goes through a very different production process due to the needs of complying with special standards and achieving the highest quality. Then, manufacturing and supplying the required raw materials, detailed production plans and required technical documents are prepared, compiled and subsequently sent to the planning and production units.

Based on the maps and technical documents, the planning unit prepares and sends the requirements that have the necessary certificates and are approved by the quality control unit. Then, the product is manufactured based on maps and technical documents, as well as following current world standards, by the production unit.

Mammut Structure & Panels Co. has been able to be certified as a contractor by utilizing the knowledge of its technical team, skilled engineering and having the latest related technologies in the world, and also by observing the standards of ANSI in America and CE in all vendor lists of oil, gas and petrochemical companies.

Fireproof Portable Cabins

A fireproof shelter is a shelter that can withstand fire up to 1,100 degrees Celsius for one hour according to the NFPA global standards. Mammut Structures and Panel's fireproof cabins are produced based on NFPA global standard and are used in some oil and gas companies. Among the advantages of Mammut Structures and Panel fireproof cabins compared to other manufacturers, we can mention the use of the best raw materials with various approvals and high technical knowledge, as well as quality control at all stages.

The most important point about this type of portable cabins is the use of fireproof paint even up to 1,500 microns in diameter, which is much more resistant than electrostatic paint and is not in the production capacity of most manufacturers.

Applications of Fireproof Portable Cabins

- Oil, gas and petrochemical industries including Substation and Control Room
- Control rooms and command centers
- Military and defense industries
- Hospital and laboratory centers
- Food industry and isolated rooms
- B security grade rooms (These rooms are usually located inside explosion-proof structures)
- All the places that are discussed in non-agent defense discussions.

Production of Fireproof Portable Cabins

- In the production of fireproof cabins, galvanized sheet is used in the thickness required by the customer.
- These cabins do not have specific dimensions and are produced according to the customer's opinion.
- Insulation of the cabin from the inside with stone wool or alternative materials with thermal conductivity coefficient W/mc = 0.041 K and the density is 120 kilograms per cubic meter, which can be changed.
- This type of enclosure is resistant to explosion in the second layer (indirect explosion up to 2 kilopascals).
- The inner space of the fireproof cabin is usually strengthened in two ways so that it does not lose its general state during a fire.
- 40 x 40 mm profile is used inside the layers of the cabin along its length (routine production).
- The grid of interior space of the cabin is made of bent sheet which is suggested for special cases and is not used routinely.
- Sealing tape and air-tight rubber are used in the opening and closing of the doors.
- It is possible to cover all or part of the cabin with anti-scratch steel sheets of different diameters for specific laboratory cases.
- The framework of cabins can be produced according to the customer's opinion and in different designs, but in many cases, the use of standard designs is recommended to maintain the quality of the product.
- According to accurate scientific calculations, changes are considered for portable cabins that have dimensions larger than the standard, to bear the weight of it on the chassis.

Store Portable Cabins

In the beginning, store cabins were installed in high-traffic areas with simple design and construction without much equipment. These cabins were very small and with a clean appearance. They were used only for work and product sales, until over time and with the advancement of technology and also the professional construction by experienced designers and builders, they became more equipped and decorated stores that attracted more customers.

One of the distinctive features of these portable cabins is that they can be easily moved to any desired place and even to another city, and in terms of cost, it is very affordable without paying a huge amount of money or paying monthly rent. It is a great help to people in business.

Types of Store Prefabricated Cabins

- Composite store portable cabins
- Siding store cabins
- Normal store cabins
- Mobile store cabins

The Advantages of Using Store Cabins

- It is anti-earthquake and does not need a foundation
- It is installed quickly and easily
- It can be moved anywhere with a semi-trailer
- Use of high quality consumables
- Speed in construction and delivery time
- Rapid resettlement of people affected by accidents during unexpected events
- Suitable for hot and cold areas
- The possibility of building in two floors
- Beauty, variety of colors and internal plan for construction

Applications of Store Portable Cabins

- **Buffet:** A store cabin in the form of buffet or shop is one of the most common ones that are used in places such as offices, medical or hospital buildings and educational or sports centers.
- **Special products store:** Some companies that reach the position of annual sales, use a series of cabins near their branches to display their products as a temporary exhibition.
- **Deli stalls:** Food industries such as fast food, and etc. can be located in any location to introduce their business and improve their sales, for this reason, store cabins are used.

Accommodation Containers

A modular accommodation container has excellent security due to high-quality materials and a strong modular structure. In addition to protection against weather events and intruders, this prefab residential container is designed to provide maximum safety, comfort and healthy living spaces for the workforce in many industries such as construction and mining. The thickness of the walls, which varies from 50 to 80 ,60 and 100 mm, guarantees maximum heat and sound insulation. Also, the design of the prefabricated accommodation container makes the building resistant to fire and against earthquake and flood protection.

This container is also very durable and high-quality, which makes the building lasts for many years. Finally, the accommodation container has several environmentally friendly features that make it an ideal option for an infrastructure solution aimed at protecting the environment.

Accommodation containers can be workplaces, homes, residences, or portable modular homes. There are many advantages to using these containers. Including excellent security, durability and environmentally friendly features of the models modern construction also offers dozens of superior features that meet the specific needs of sites.

These containers can provide long-term services in construction and mining sites and in areas with extreme desert weather. Residential containers are also resistant to fire and can be used to protect you from earthquakes and floods.

Technical Specifications

- **Structure:** surface and frame of steel sheet with strength and high quality painted.
- **Interior wall:** Polyurethane or stone wool insulated sandwich panels for exterior and interior walls.
- **Insulation thickness:** 50mm, 60mm, 80mm or 100mm
- **Roof and wall:** 80mm Polyurethane insulation
- **Flooring:** 18 mm fiber cement panel surface + 2 mm PVC flooring, parquet or ceramic tiles (optional) ,50 or 100 mm floor chassis insulation (optional).
- **Door and window joinery:** aluminum or PVC windows. Lighting and electrical equipment are included.
- **Sanitary equipment:** ceramic hand wash 37x45 cm, acrylic shower tray 102x92 cm, ceramic toilet

  Option: Inox WC and hand wash, compact laminate bathroom and shower cabin

  Interior arrangement (optional): air conditioning, fully equipped kitchen, furniture, data socket.
- **Connection set (optional):** A connection set is provided to connect to or facilitate overlapping.
- **Additional roof (optional):** Galvanized trapezoidal roof or additional polyurethane insulation sandwich panel roof cover.
- **Delivery in a special package:** Up to 8 accommodation containers are delivered in a special package with a 40 Cube High shipping container.

The best choice of accommodation container for construction and mining companies

- Residential containers are a practical and economical alternative for construction and mining companies because they can be quickly assembled and dismantled. However, the best choice for the container construction site or mine to specific needs, depends on your budget and operating time.
- Modular accommodation containers are offered in various sizes, including 6 x 2.50 meters, which can be used for offices. With a medium size and 11.70 x 2.50 meters, it is suitable for larger spaces. Their internal height is 2.40 on average meters, which provides enough space for air circulation in hot areas.
- Available thicknesses of 80 ,60 ,50 mm and 100 mm guarantee maximum heat and sound insulation inside the prefabricated container of the residence during work. There is also wall insulation made of stone wool or polyurethane (PUR), which is very effective, light-weight and able to connect with all known materials.

On-Site Portable Cabins

These types of cabins are made of steel frames and prefabricated walls made of Mammut Structures and Panels, sandwich panels, which are optimally packaged and assembled at the desired location. This feature makes it possible to transport the portable cabins in large numbers and at the lowest possible cost. This product is currently used in many construction sites, villages, accident areas and etc.

The use of on-site prefabricated cabins is mostly done when it is not possible to transport and move to the installation site. Numerous factors can lead to the impossibility of moving the cabins to one place.

If there are obstacles such as large trees, narrow streets, construction of cabins on the roofs of buildings, difficult areas, accident-prone areasand etc., the use of on-site assembly portable cabins is the best choice.

However, some customers prefer to place the structure as a separate piece or in the form of raw materials to the place due to special transportation conditions, avoiding high transportation costs for a portable cabin, lack of sufficient space for storage and some other limitations, also move and perform part of the construction process at the desired location.

The most important features of an on-site portable cabin in Mammut Company:

1) Design and manufacture of the best product, to preserve the main characteristics of the cabin after the on-site assembly operation.

2) Utilizing the best technical specifications to increase the strength of the cabin, which will ultimately lead to a long life of.

3) Design and construction of a product that according to the location of the portable cabin, even after the assembly operation is heat insulating.

Restroom & Bathroom Portable Cabins

This is actually a small cabin that has one or more toilets or bathrooms and sometimes with a bathroom and toilet.

The design and use of these cabins reduces costs compared to the traditional ones and also makes all plumbing and sewage facilities centralized in one place, which ultimately reduces costs.

Today, the use of restroom cabins in the public thoroughfares of cities, checkpoints in town, temporary accommodation camps, workshop camps and etc. has found a special place.

In developed countries, restroom cabins are quickly rented and installed by contractors at the project site. The capacity of these portable cabins is variable and can be ordered at any capacity.

Mammut Structures and Panel's produces a kind of portable cabin which takes up little space. This kind of cabin does not require much space for storage, but a many of them can be stored in a small space and used in times of need or crisis in the shortest possible time.

Centers such as the United Nations, charities, the Red Cross, the Red Crescent, the refugee camp, crisis headquarters, many industrial companies, oil and petrochemical companies and etc. are valuable customers of Mammut Structures and Panel Co. since that the structures generated by Mammut Structures and Panel Co. are produced using sandwich panels and the best materials, these types of structures are usually used in industry and have very high durability.

Cold Storage Portable Cabins

A Cold room cabin is a storage for a variety of materials with the ability to adjust and change the temperature from below zero to above zero.

The size and capacity of the cold storage varies according to the customer's request and can be designed and produced from small to very large areas.

In applications where the installation speed of the cold storage is important and there is no need to build a cold storage room, a fixed portable cabin is used. These cold room cabins can be installed indoors and outdoors and can store a variety of food, pharmaceutical and laboratory products.

The dimensions of the cold room cabins are made according to the capacity and type of products in special models. Generally, polyurethane sandwich panels with a thickness of more than 10 cm are used for covering walls of cold rooms in the surrounding walls, floor, ceiling and interior, but in special circumstances, sandwich panels with a thickness of 15 cm are also used.

The quality of the structure and sandwich panels in terms of sheet structure, paint coating and quality of injection foam, density and technology used in the way of injection by the relevant machines, has a significant effect on the quality of cold storage. This can greatly reduce or increase the energy costs of the consumer and also have a direct and significant impact on the quality of food storage.

Our cold storage portable cabins have many different uses and are used to store protein foods or for environmental storage and laboratory activities.

The Mammut Structures and Panel Co., by using unique, proprietary technology and high-quality sandwich panels, has been able to revolutionize the refrigeration industry and has brilliant resumes in many related large-scale projects.

Telecommunications Portable Cabin

Telecommunication cabins or shelters are special prefabricated structures that are used to install sensitive equipment and devices in the telecommunication industry in EC, NSS, VAS, MSC, SATA, BSS, BTS Tx, military, electrical, power plant, aerospace, nuclear and security.

The type and size of these portable cabins are determined and ordered according to their application. Because shelter rooms are often used in very bad and unsuitable places and climatic conditions, in the structure of such cabins following the principles of standard and safety, should be done by experienced builders and using high and up-to-date technology.

Shelter rooms can be built on a fixed basis, mounted on a foundation, as well as mounted on a truck and wheeled portable remote system. These portable cabins are used for the establishment of BTS mobile telecommunication stations, radio and wireless transmitters, special satellite systems, etc. which are made of sandwich panels with thicknesses of 4, 5, 6,...,10 with their own skeletons. In this type of portable cabin, special facilities are considered for the installation of telecommunication devices so that the BTS cabin can be easily used in telecommunication and satellite works. Telecommunication portable cabins can also be produced in a mobile way.

Mammut Structures and Panel Co. is proud to produce this product with executive technical approval according to the American ANSI standard and approval of Iran Telecommunication Company and is known as the most reliable manufacturer and business partner of reputable companies providing telecommunication services in this industry.

Guard Portable Cabins

From past years, the use of guard rooms with different uses of neighborhood guards, police and entrances to various complexes and factories has been common, and despite the use of intelligent monitoring systems, it is still preferred that the main task be performed by the guard.

Guard posts are small prefabricated structures that are installed at the entrances of companies, parking lots or sometimes neighborhoods and are the location of the guard for controlling tasks in the complex.

Based on the expected efficiency as well as the number of personnel who have to take control, Mammut portable cabins are produced in different dimensions.

Security portable cabins must have special features so that the security team can do its job well. At Mammut design section, we always try to observe and improve these features in different designs.

The most important features of Mammut guard cabins are:

1) Utilizing the best technical specifications with to increase the strength of the structure, will ultimately lead to a long life of the conex.

2) Design and construction of a product that according to the location of the portable cabin is heat insulating.

3) Proper design to create a suitable vision with the least blind spot to the area under the responsibility of the guard.

4) Utilizing the most efficient dimensions, commensurate with the expected efficiency and the number of personnel.

5) Beauty in the conex view using a suitable design, beautiful and homogeneous colors with the location and use of the product.

Turnpike Portable Cabins

Turnpike portable cabin is a type of cabin with security use that is used to control and collect tolls on freeways. The customers of Turnpike cabin are mostly government agencies and private companies in the field of road and tunnel construction. At the end of the project, they also build the turnpike stations that should be created along the way and then install them on special platforms that have been installed for this purpose.

Usually, not all turnpike gates are the same and may be different depending on the region, weather conditions, specific details, etc. However, it usually has a two-sided mode for collecting tolls, for which purpose, doorways and sliding windows are installed on both sides. Generally, to build this structure, a place should be considered for installing air conditioners, desks and office equipment, fire extinguishers and first aid kits.

The important point in designing a turnpike portable cabin is that each cabin should have space for two employees to sit parallel next to each other because the cars pass on both sides of the barracks. The windows should also be sliding so that they can be closed when needed and do not occupy the interior space when they are open.

The slope of the roof should be transverse so that rainwater does not flow in front of the windows and does not disrupt the activity. The roof of the turnpike portable cabin is usually a very high structure for passing high-altitude vehicles, and when it rains, if the wind blows and the slope is not transverse, rain will inevitably penetrate the cabin.

Since that turnpike cabins are located on roads and in harsh environmental conditions, and also to maintain the health of personnel, the need to maintain the temperature of the indoor environment and the penetration of heat or cold in them is very important.

Mammut Structures & Panel Co. designs and manufactures its portable cabins in such a way that while having a long life and maintaining good quality; it provides long-term security and comfort for the people living in it.

Workshop Portable Cabins

workshop portable cabin is one of the simplest prefabricated structures and its application is in construction and development spaces, road construction and construction workshops. The workshop portable cabin is generally used for temporary or permanent accommodation of workers.

The two main reasons for using portable cabins in civil engineering and construction projects are:

1)Permanent settlement of labor due to the distance of the project from the place of residence, such as road construction projects which are located outside the city.

2) Rooms for staff accommodation and rest, during the construction of buildings and apartments. In each construction workshop, there are usually several workshop cabins with different uses, some of which are used for workers' rest rooms, engineers' offices, and some for services.

Usually, before starting work in a construction workshop or demolition, cabins that are also cost-effective are prepared. Depending on the progress of the project and the addition of work crews, more of these types of cabins may be purchased and deployed at the project site. Generally, after the project is completed, existing portable cabins are sold as used cabins to colleagues or other contractors, or stored on site to be reused in future projects. The workshop portable cabin has several advantages that make it a permanent member of construction operations.

Some of these benefits are:

- **High speed in equipping the cabin:** Due to the prefabricated, the speed of equipping is much higher.
- **Portability:** During the progress of the project, we may have to relocate temporary structures and workshop engineers' offices many times, which is only possible with the use of prefabricated structures.
- **Reduction in costs:** The construction of structures with traditional materials is always associated with high wages and a lot of time, and also the requirement to demolish temporary structures in exchange for the ability to move or sell the portable cabins at the end of the project, reduces costs.
- **To avoid wasting energy:** Due to the use of standard insulation in the walls of portable cabins, energy loss is largely avoided.
- **Beauty and efficiency:** Temporary structures that are usually made with building materials do not have any equipment and decorations, while portable cabins are usually very beautiful in this regard.
- **Earthquake resistance:** One of the advantages of using the conex is its resistance to earthquakes and natural disasters, which makes the personnel who rest at the workshop at night safe.

Special Portable Cabins

Construction of cabins with special uses is one of the main concerns of customers who are looking for their cabin to be designed and built exactly to their needs. Mammut Structures & Panel CO., with its very powerful design and engineering team, has been able to minimize this concern among its customers. The following are some specific ones:

Clinic

A clinic is a building or part of a building that is designed to provide health services. Clinics are specialized or general in which health services, emergencies, vaccinations, etc. are provided. The prefabricated clinic is a pre-designed structure whose components are prefabricated in the Mammut factory and take place at the final assembly site. The walls of this structure are made of Mammut sandwich panel in different forms and also the roof sandwich panel is used to cover the roof of clinics.

Sandwich panels are placed on the chassis and frame of the structure using steel rivets, which are made of steel profiles. Clinic flooring is usually made of wood parquet, which is a combination of P.V.C and refractory wood powder.

A prefabricated clinic has all the necessary facilities in accordance with the relevant plans, including water, electricity, etc., and can be easily operated.

Some types of prefabricated clinics with different uses in indoor and out- door spaces are:

- Use as an inpatient ward of a hospital in case of full capacity
- Small health centers in remote and deprived areas
- Establishing emergency medical and treatment centers
- Mobile and rural dental clinic
- Field and inter-road emergency clinic
- Mobile clinic in times of crisis such as natural disasters
- Small clinics in tourist and recreational areas
- Vaccination centers inside and outside the city
- Providing medical services in military areas
- Blood transfusion bases

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